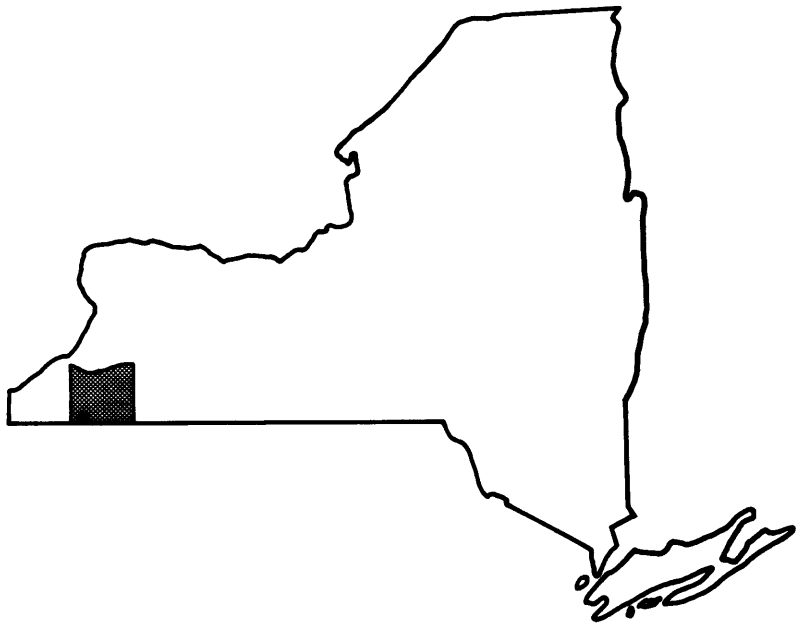
FLOOD INSURANCE STUDY

TOWN OF COLD SPRING, NEW YORK
CATTARAUGUS COUNTY



SEPTEMBER 1977

U.S. DEPARTMENT of HOUSING & URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

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FLOOD INSURANCE STUDY
TOWN OF COLD SPRING, NEW YORK

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the Town of Cold Spring, Cattaraugus County, New York, and to aid in the administration of the Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert the Town of Cold Spring to the regular program of flood insurance by the Federal Insurance Administration (FIA). Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1.2 Coordination

At a meeting held July 28, 1975, with representatives of the Town of Cold Spring, the FIA, the Cattaraugus County Planning Board, the New York State Department of Environmental Conservation (DEC), and the firm of Erdman, Anthony, Associates, the purpose of the Flood Insurance Study was explained.

A search for basic data was made at all levels of government. The U. S. Geological Survey (USGS) was contacted to obtain contour maps showing drainage boundaries. Information regarding flow data was not available from USGS, as there are no existing flow records in the area. A representative of the Town of Cold Spring provided information used in the community description and assessment of past flood problems.

An additional meeting was held on April 11, 1976, with village officials to obtain additional local input. The final Consultation and Coordination meeting was held on January 5, 1977, to present the final draft of this Flood Insurance Study for review.

1.3 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by the New York State Department of Environmental Conservation for the Federal Insurance Administration under Contract No. H-3856. This work, which was completed in January 1977, covered all flooding sources in the Town of Cold Spring, with the exception of several small streams.

Approximate flood boundaries for these tributaries were determined by Dewberry, Nealon & Davis, Consulting Engineers in February 1977.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of Cold Spring. The area of study is shown on the Vicinity Map (Figure 1). Areas excluded from the study are the Allegheny Indian Reservation and a state park in the southern part of the town.

It was agreed between the FIA, the study contractor and the Town of Cold Spring that 4,900 feet of Cold Spring Creek Tributary flowing through the hamlet of Steamburg would be studied by detailed methods.

The remainder of Cold Spring Creek Tributary, Cold Spring Creek, Conewango Creek, Tributaries No. 2, 3, 4, 5, and 6, and a swamp area south of the State Fish Hatchery were studied by approximate methods. Approximate methods were used due to the small size of the flood plain and lack of development along these streams.

Sawmill Run, Sunfish Creek, Hotchkiss Run, Robinson Run, Tributary No. 1, and Tributary No. 7 were identified as flood hazard areas by the FIA (Reference 1) and are delineated as areas of approximate study.

The areas studied in detail were chosen with consideration given to all forecasted development and proposed construction for the next five years (through March 1980).

2.2 Community Description

The Town of Cold Spring is located in the western portion of Cattaraugus County of western New York State. The town is bounded on the west by the Towns of Randolph and South Valley, on the north

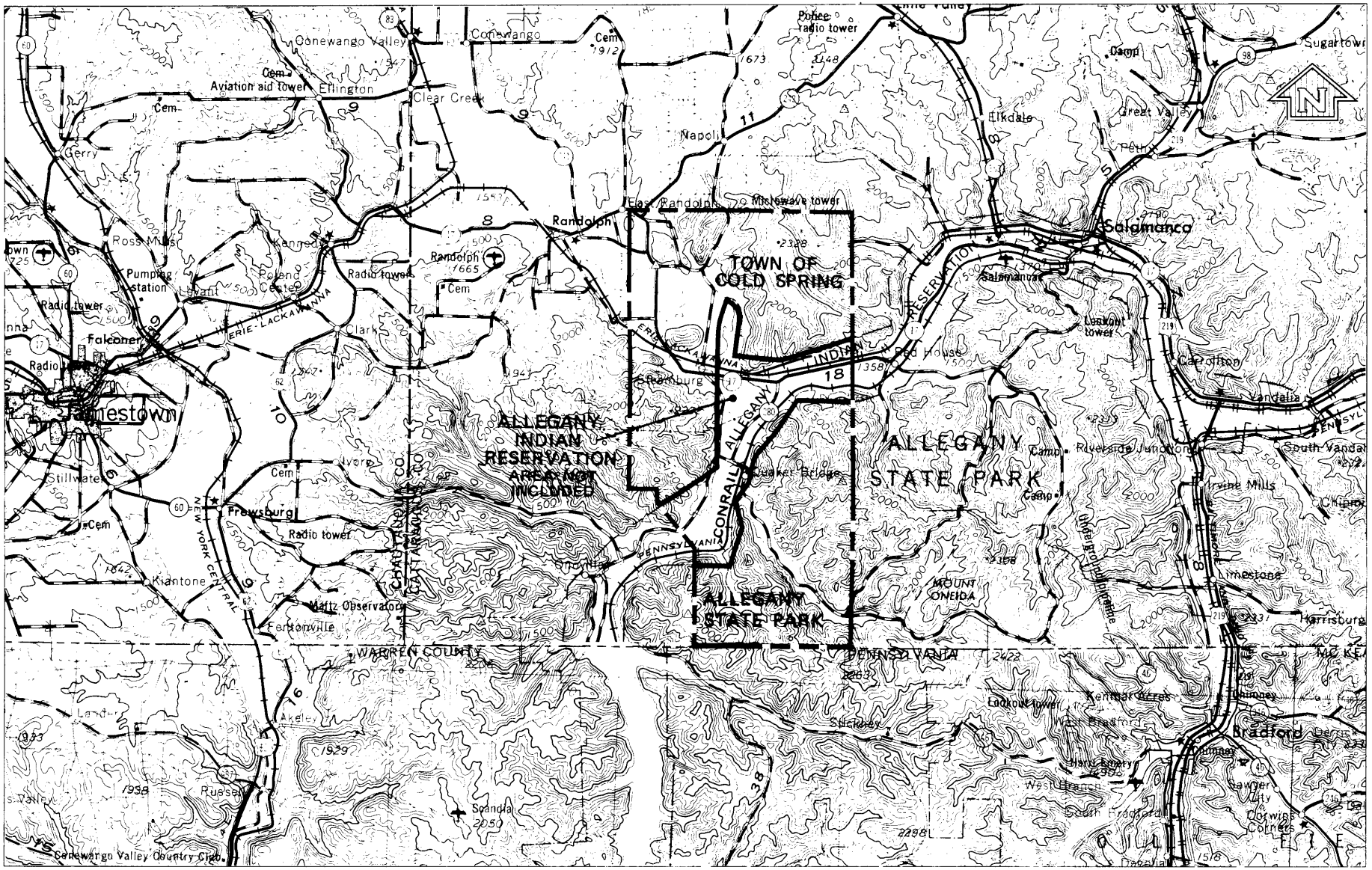


FIGURE 1

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF COLD SPRING, NY
(CATTARAUGUS CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

by the Town of Napoli, on the east by the Towns of Salamanca and Red House, and on the south by the Township of Corydon, McKean County, Pennsylvania.

The town is sparsely populated. The population has remained fairly stable over the last half century exhibiting a slight decline since the 1950 census. This was offset by the annexation of the neighboring Town of Elko in 1965, increasing Cold Spring's population by roughly 70 persons. The 1970 population was 638.

The Town of Cold Spring is located in the glaciated Allegheny Plateau section of the Appalachian Plateau Province. The topography is that of a maturely disected plateau which was modified notably by Pleistocene glaciation, particularly the late Wisconsin glaciations (Reference 2). Noticeable landforms in the Cold Spring area include ground moraines, kettle lakes, and swamps, all of which are typical of Wisconsin Glacial Outwash. Uplands in the northeastern part of the town rise to 2,300 feet National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as mean sea level with the 1929 General Adjustment. The elevations drop steeply to 1,300 feet NGVD along the Allegheny River in the southeast.

The south and west portions of the town drain directly to the Allegheny River. Land along this reach of the Allegheny River is within the Allegheny Indian Reservation. The northwest quadrant of the town is not as well drained. Drainage is provided by numerous small tributaries to Little Conewango Creek, which joins the Allegheny River in Pennsylvania.

Land use in the town is primarily woodland and forest. Some agricultural development has taken place in the valley bottoms. The only area of significant residential development is within the hamlet of Steamburg, which is located on Cold Spring Creek Tributary. Roads and railroads, as well as some residences, occupy portions of the tributary's flood plain. Portions of the flood plain are illustrated by photographs in Figures 2 and 3.

The climate is typical of western New York with warm summers and winters of moderate to heavy snowfall. Average January and July temperatures are 25°F and 70°F, respectively. Precipitation is approximately 45 inches a year, of which 24 inches becomes runoff.

2.3 Principal Flood Problems

Due to the steep terrain, the small streams in the Town of Cold Spring are subject to flash flooding from intense cyclonic

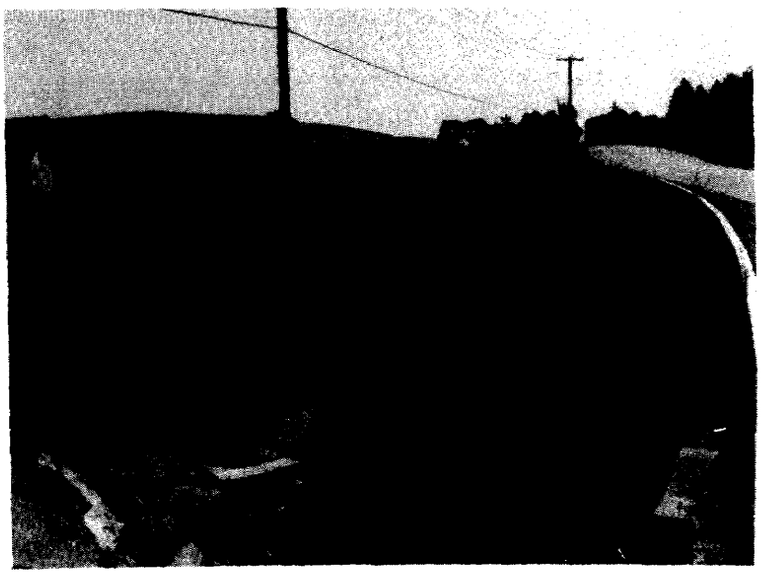


Figure 2 - Unnamed Tributary Number 3, Looking East (Downstream) from N.Y. Route 17

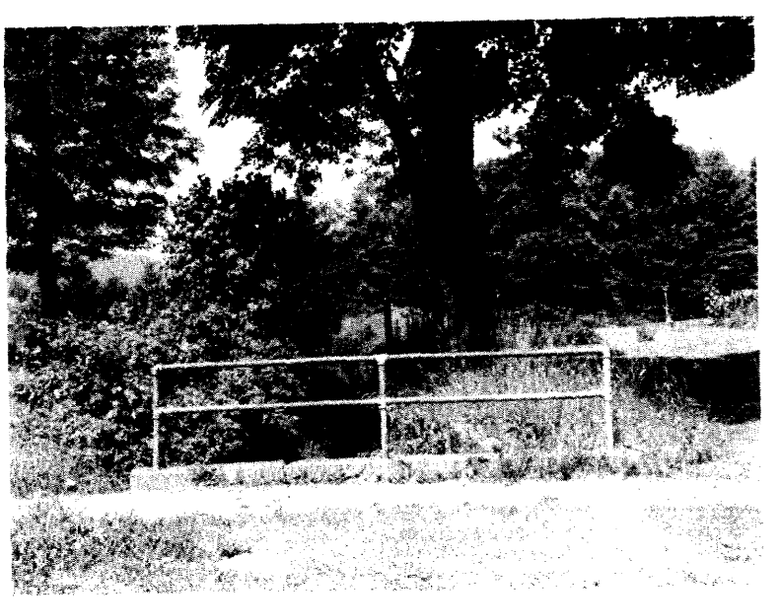


Figure 3 - Unnamed Tributary Number 3, Looking West (Upstream) from Lebanon Road

disturbances that occur in summer and fall. Heavy rains in winter or early spring augmented by snowmelt also cause flooding problems.

The USGS has maintained no records within the study area. Residents along the streams have been interviewed and previous flood information reports of the region searched for information concerning past floods. From these investigations, it is known that the Hamlet of Steamburg has sustained damages from past floods. Significant flooding is reported to have occurred in September 1967, and in June 1972. Flood waters caused inundation of streets and flooding of homes.

2.4 Flood Protection Measures

There are no formalized flood protection measures and no flood control structures within the study area.

3.0 ENGINEERING METHODS

For the flooding source studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Floods having recurrence intervals of 10, 50, 100, and 500 years have been selected as having special significance for flood plain management and for flood insurance premium rates. The analyses reported here reflect current conditions in the drainage area of the stream.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for the stream studied in detail in the community.

For Cold Spring Creek Tributary, a Bureau of Public Roads technique was used to establish the hydrology (Reference 3). This technique is based on inputs of drainage area, gage records, a shape factor, and storage and slope of the basin. This method is selective for a regional application to the Appalachian Plateau region based on observations within the area.

For the remainder of Cold Spring Creek Tributary, Cold Spring Creek, Conewango Creek, Tributaries No. 2, 3, 4, 5 and 6 and the swamp area studied by approximate methods. Flood boundaries were developed using USGS flood height-drainage area (Reference 4) relationships for selected drainage areas determined from USGS 7.5-minute topographic maps (Reference 5).

Approximate flooding on the remainder of the identified streams was delineated using FIA Flood Hazard Boundary Maps (Reference 1).

Values of the 10-, 50-, 100-, and 500-year peak discharges were determined for the stream studied in detail. Drainage area peak discharge relationships for this stream are listed in Table 1, Summary of Discharges.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
COLD SPRING CREEK TRIBUTARY					
800 feet downstream from Lebanon Road	1.50	75	108	124	161

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the stream studied in detail in the town was carried out to provide estimates of the elevations of floods of the selected recurrence intervals along this stream.

Cross section data for Cold Spring Creek Tributary were obtained by field survey. Cross sections were located at close intervals above and below bridges, at control sections along the stream length, and at significant changes in ground relief and land use or land cover. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Boundary and Floodway Map (Exhibit 3).

Roughness coefficients, Manning's "n", were assigned on the basis of on-site field inspections and ground level photographs. These photographs were compared with USGS calibrated photographs (Reference 6), taking into consideration channel conditions, overbank vegetation and land use. Values of Manning's "n" for the stream studied in detail ranged from 0.024 to 0.055 for the channel and was 0.070 for the overbanks. The two long culverts were assigned an "n" value of 0.014.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1). Water-surface elevations of floods of the selected recurrence intervals were computed through use of the COE

HEC-2 Step-Backwater Computer Program (Reference 7). Starting water-surface elevations for the stream studied in detail were computed using the slope-area method. The origin of study for Cold Spring Creek Tributary is 200 feet upstream from the boundary of the Allegheny Indian Reservation.

Reach lengths for the channel were measured along the centerline of channel between sections and overbank reach lengths measured along the approximate centerline of the effective out-of-channel flow area.

All elevations are referenced from the NGVD; elevation reference marks used in the study are shown on the maps.

Flood elevations higher than those computed through use of the HEC-2 step-backwater program can occur as a result of the effect of ice jams during spring thaws. However, adequate data are not available to establish stage frequency curves during ice periods.

The hydraulic analyses for this study are based upon unobstructed flow. The flood elevations on the profiles are valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

For the remainder of Cold Spring Creek Tributary, Cold Spring Creek, Conewango Creek, Tributaries No. 2, 3, 4, 5, and 6, and the swamp area which were all studied by approximate methods.

USGS Flood Height-Drainage Area Relationships for 100-year flooding were utilized (Reference 4). Drainage areas were developed at selected locations from USGS 7.5-minute topographic maps (Reference 5) and 100-year flood heights were then extracted from the Flood Height-Drainage Area Relationships. Using the USGS topographic maps for differential elevation reference, approximate 100-year inundation limits were plotted on community work maps.

No Flood Height-Drainage Area Relationships were developed by the USGS for the Allegheny River Basin; however, the upper Genesee River Basin immediately to the east of the Allegheny River Basin has definite hydrologic and hydraulic similarities to the area of study and was therefore used in the analysis.

Approximate flooding on the remainder of the identified streams was delineated using FIA Flood Hazard Boundary Maps (Reference 1).

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community.

For the stream studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps developed for this study at a scale of 1"=400' with a contour interval of 5 feet (Reference 8). In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year flood boundary has been shown.

Boundaries for the streams studied by approximate methods were delineated using these same 1"=400' topographic maps.

These boundaries are shown on the Flood Boundary and Floodway Map (Exhibit 3). Small areas within the flood boundaries may lie above the flood elevations, and therefore may not be subject to flooding; owing to limitations of the map scale or lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway

and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodway in this report is presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodway presented in this study was computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations are tabulated at selected cross sections for the stream studied in detail (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 3), the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or colinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 4.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHF) and flood insurance zone designations for each flooding source affecting the Town of Cold Spring.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Cold Spring Creek Tributary							
A	0	20	57	3.66	1383.5	1382.5	1.0
B	1,000	82	88	2.36	1389.0	1388.7	0.3
C	1,522	60	108	1.93	1391.7	1391.6	0.1
D	2,125	13	30	4.19	1393.7	1393.5	0.2
E	2,350	5	17	7.30	1396.9	1396.9	0.0
F	2,715	16	60	2.07	1399.0	1399.0	0.0
G	3,545	19	23	5.46	1403.1	1403.1	0.0
H	4,200	13	22	5.68	1409.2	1409.2	0.0
I	4,900	14	29	4.26	1417.8	1417.8	0.0

[1]FEET ABOVE ORIGIN OF STUDY

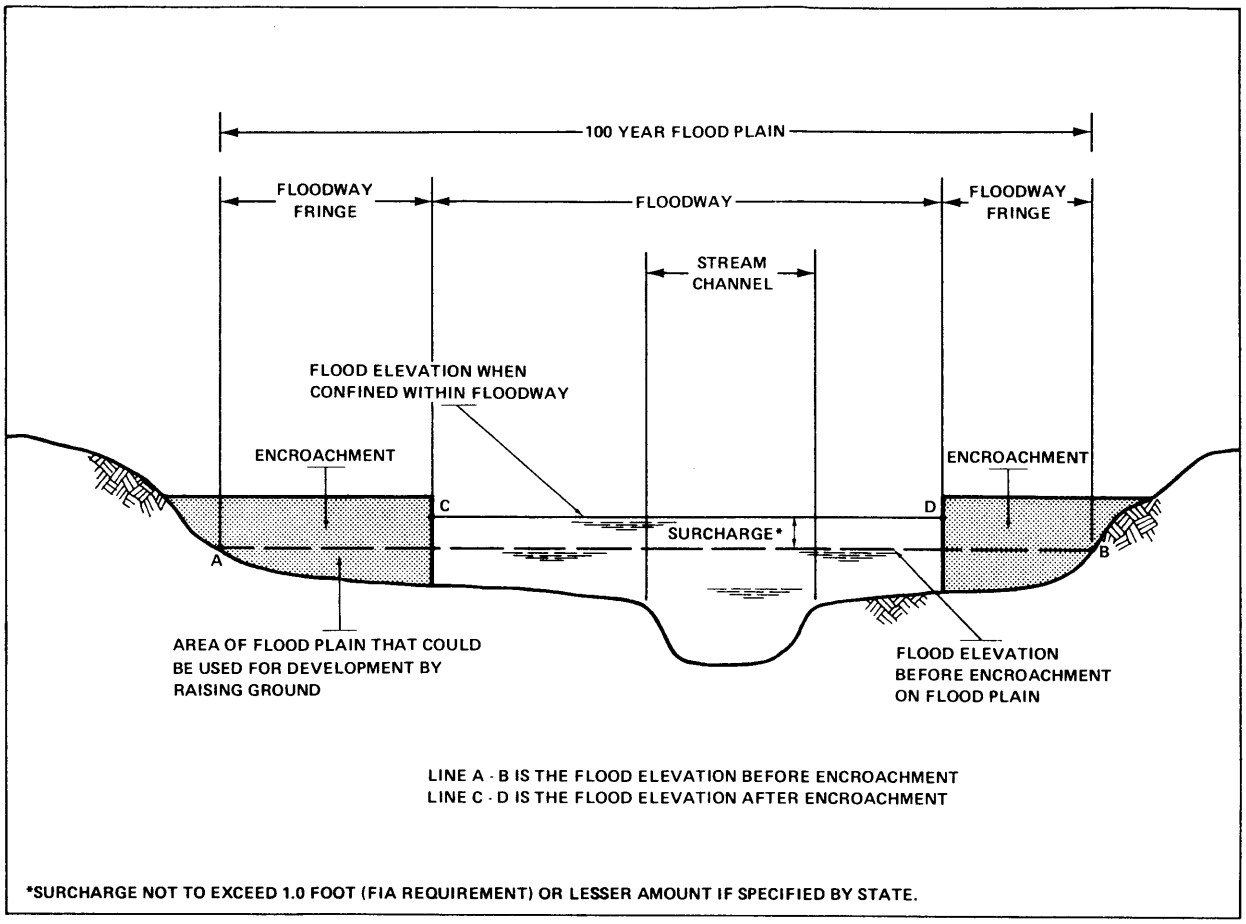
TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF COLD SPRING, NY
(CATTARAUGUS CO.)

FLOODWAY DATA

COLD SPRING CREEK TRIBUTARY



FLOODWAY SCHEMATIC Figure 4

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot

Three reaches meeting the above criterion were required to establish flood insurance zones for the Town of Cold Spring. All three reaches are located on Cold Spring Creek Tributary. The locations of these reaches are shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors

The FHF is the FIA device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based upon FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire area of study was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods, no base flood elevations shown or FHFs determined.
Zones A1, A2:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Areas and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; and areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot. Zone B is not subdivided.
Zone C:	Areas not subject to flooding by the 500-year flood, including areas that are protected from 500-year floods by dike, levee, or other water control structure. Zone C is not subdivided.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding source studied in detail in the community.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Cold Spring Creek Tributary							
Reach 1	0003C	-0.39	-0.18	+0.24	005	A1	Varies
Reach 2	0003C	-1.10	-0.45	+0.59	010	A2	Varies
Reach 3	0002C-0003C	-0.44	-0.18	+0.29	005	A1	Varies

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT – SEE MAP

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF COLD SPRING, NY
(CATTARAUGUS CO.)

FLOOD INSURANCE ZONE DATA

COLD SPRING CREEK TRIBUTARY

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Town of Cold Spring is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

6.0 OTHER STUDIES

No other studies of flooding have been performed for the Town of Cold Spring. Flood Insurance Studies are currently underway by the New York State Department of Environmental Conservation for other communities within the Allegheny Basin. However, none of the communities contiguous to the Town of Cold Spring are being studied at this time.

This study is authoritative for purposes of the Flood Insurance Program.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data are on file for five years (until March 1980) at the New York State Department of Environmental Conservation, 50 Wolf Road, Albany, New York 12233.

8.0 BIBLIOGRAPHY AND REFERENCES

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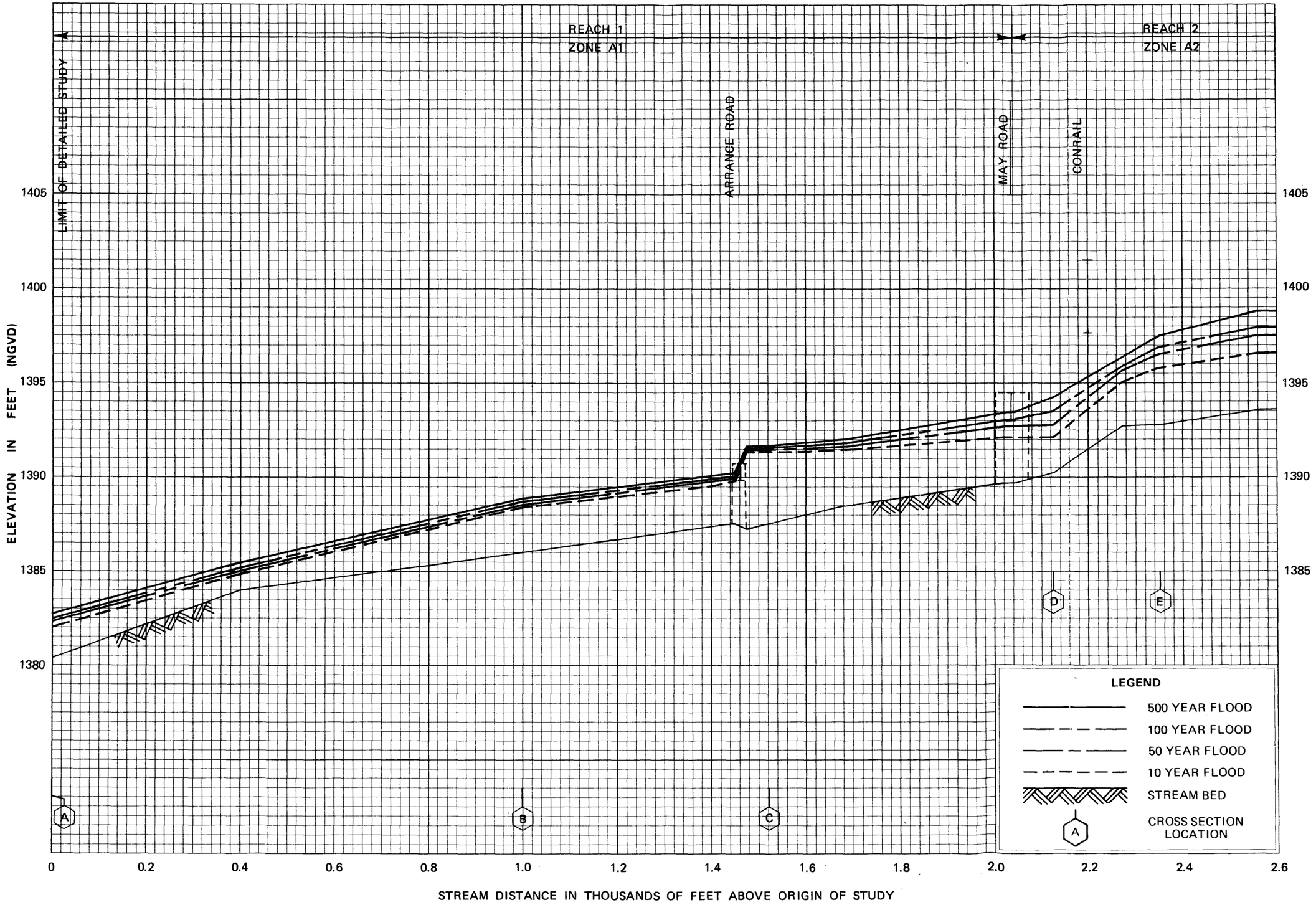

FLOOD PROFILES

COLD SPRING CREEK TRIBUTARY

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF COLD SPRING, NY
(CATTARAUGUS CO.)

01P

EXHIBIT 1

REACH 2
ZONE A2

REACH 3
ZONE A1

LEBANON ROAD

FARM LANE

FARM LANE

LIMIT OF DETAILED STUDY

WHERE THE 50- AND 100-YEAR ELEVATIONS ARE CLOSE TOGETHER ONLY THE 100-YEAR ELEVATION HAS BEEN SHOWN.

ELEVATION IN FEET (NGVD)

1420
1415
1410
1405
1400
1395
1390

2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0 4.2 4.4 4.6 4.8 5.0

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE ORIGIN OF STUDY

F G H I

LEGEND

- 500 YEAR FLOOD
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- A — CROSS SECTION LOCATION

FLOOD PROFILES

COLD SPRING CREEK TRIBUTARY

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
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TOWN OF COLD SPRING, NY
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02P

EXHIBIT 1